Silicon cockroaches, 'dirty' IPv4 addresses and other Internet oddities. PAGE 14

NETWORKWORLD

THE CONNECTED ENTERPRISE ≡ APRIL 5, 2010

VOLUME 27, NUMBER 7 | $5.00

CLEAR CHOICE TEST

ENTERPRISE CLOUD COMPUTING

Cloud vendors ace groundbreaking test

Terremark, Rackspace, BlueLock deliver fast, secure cloud services. **Page 24** ▸

Microsoft vs. DoJ: Who learned what?

Taking stock 10 years after ruling

BY DENISE DUBIE

TEN YEARS after losing a bitterly contested antitrust battle to the U.S. Department of Justice, debate continues as to whether Microsoft was tamed by the legal rebuke or the company treated it like a speed bump.

In April 2000, U.S. District Court Judge Thomas Penfield Jackson ruled that Microsoft violated federal and state antitrust laws and ordered the company to decouple its operating system and browser technology, pay hefty fines and undergo years of scrutiny to prevent future market monopolizing. The ramifications of the years-long trial continue in the European Union for Microsoft today.

Microsoft remains a powerhouse — reporting in January record revenues of nearly $20 billion for its second fiscal quarter— but the 2000 ruling has meant more choices in the browser arena and enabled an industry to innovate

▸ *See* **Microsoft,** *page 17*

Endpoint security casts ever wider net

BY TIM GREENE

PROTECTING NETWORK endpoints is becoming more difficult as the type of endpoint devices — desktops, laptops, smartphones — grows, making security a complex moving target.

The problem is compounded by the fact that different groups rely on the devices for different needs and levels of protection for myriad enterprise resources.

Deciding the appropriate device defense becomes the No.1 job of endpoint security specialists, says Jennifer Jabbusch, CISO of Carolina Advanced Digital consultancy. Depending on the device and the user's role, endpoints need to be locked down to a greater or lesser degree.

▸ *See* **Endpoint,** *page 16*

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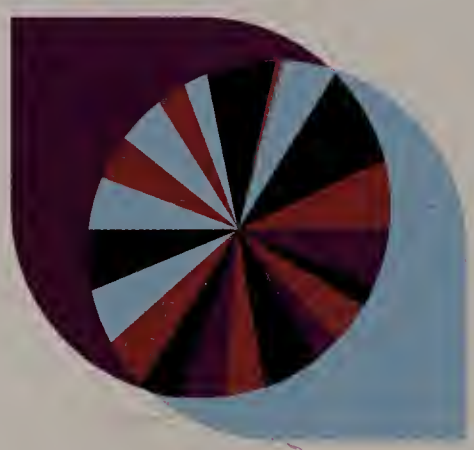

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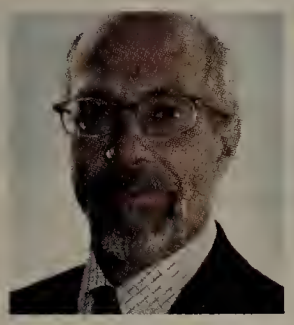
FROM THE EDITOR | JOHN DIX

Crafting a UC strategy

If you have been putting off crafting your unified communications strategy, we don't blame you. The more you know, the more you realize how much you don't know.

There are many ways to approach the opportunity, lots of competing technologies, loads of legacy investments to accommodate, political issues to address, and questions about everything from how to identify key business processes to how to measure success.



If that sums up your feeling about UC, take solace in the fact that you're not alone. Even some of the largest companies haven't figured it out. One Fortune 100 company recently appointed a UC czar to piece it together. His job: crafting a vision, a road map and an architecture, no mean feat in a company with hundreds of thousands of employees.

While you hear some talk about UC leading to cost savings — minimizing a bit of travel or enabling you to consolidate some servers or voice mail systems — UC is really about improving productivity by stitching together various systems employees rely on.

But what center do you build from? Should UC be anchored by your VoIP/voice mail system? E-mail/IM? Your mobile/smartphone platform? Your audio/video/Web conferencing systems? Maybe your desktop apps? Or do you even have to pick a core?

Don't fall into the trap of making that decision too early, experts say. While you need to be cognizant of the various capabilities/limitations of the platforms, don't pick one before you know where you want to go.

To figure that out, let the users be the guide. Do some internal survey work and let them tell you what would simplify/improve their jobs. After all, UC is all about helping these folks make better decisions faster, or improving their ability to serve customers, or facilitating the manner in which they collaborate on different tasks.

With that in hand, you can identify a few test cases and then match these targets to the capabilities of your existing systems and identify where you need to fill in the gaps. The tricky part, however, is assessing whether the resulting plan is resilient enough to support other foreseeable needs. You don't want to paint yourself into a corner. And it is perhaps this last worry that stymies more UC efforts than anything.

Paralysis isn't much of a strategy, though, so it is important to reach a conclusion and plow ahead. A controlled introduction will minimize the risks and, hopefully, lead to enough success to build onward and upward.

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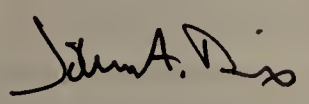

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COVER ILLUSTRATION: STEPHEN SAUER

inside

APRIL 5, 2010

peersay

Don't downplay security with hosted mail

I WOULD HAVE thought that your reader base was more security-oriented or interested than this article suggests. (Re: Tech Debate: Google Gmail vs. hosted Microsoft Exchange; tinyurl.com/yfsmc8l.) Neither [Jonathan] McCormick nor [Daniel] Riley mention the required trust factor involved in an organization hosting mail with any vendor, though it did finally get a hint of recognition on page 20 under "Regulated Industry".

If we were to somehow set this matter aside, there also was no mention of support for digital signatures (which Exchange natively supports in Outlook Web Access and Gmail does not).

Scott Paddock

Ethics and morality are not the same

WHILE I DEFINITELY understand and applaud those who stop to really give their ethical position serious thought, there are some deeper thoughts that go along with ethical positions that are easy to miss. (Re: Seven ethical questions; tinyurl.com/y8vb5fx.) Additionally there seems to be a bit of confusion, as you talk about pondering business ethics and then use personal ethics in your questions. For instance, for question one, instead of asking whether or not I would personally review the misdirected e-mail, it would be a better business ethics question to ask what the ethical response by a business would be in this situation. Would it be ethical for a business to fire A) the sender, B) the recipient, C) both A and B, or D) None of the above, and why?

But given the posed questions you're going to get a lot of personal ethics responses. Which isn't always a bad thing, however it may lead to a lot of very saintly responses that wouldn't have a lot of basis in how the world works or what someone would actually do. Sure, we all think it's great to give money to charity, save the whales, drive a Prius, and stop crime. Or at least we say we do because we know that it's the morally correct answer that other people expect, but morality and ethics are not the same concept.

An ethical action is one that is taken as a result of weighing the total sum of the moral imperatives against the situation to determine its ethical value. As a result it's possible to be completely immoral and ethical, as well as to be completely moral and unethical. If you kill a person and prevent the imminent murder of a child, that action would be ethical, even if you were only there to kill him/her for an immoral reason, the result is ethical outside of your own morality.

udtknwme

'Real' war doesn't happen over the Internet

IT'S HARD TO imagine how the term "war" could be applied to "cyber" activity, the wild speculation of U.S. Department heads and online commenters notwithstanding. (Re: It does not take a village — or a country; tinyurl.com/yguw93g).

There is such a thing as cyber warfare, it is the modern evolution of signals intelligence. If country A blocks country B's intelligence drones from transmitting; if country B "kills" country A's battlefield communications capability during a military skirmish — that is "cyber warfare". Criminal hacking, Web site defacement, denial-of-service attacks —especially those directed against non-military and non-infrastructure targets — are not "war" of any kind. Let's be very clear; war results in people being killed, in property being destroyed, in infrastructure and logistical capabilities being crippled. And by "infrastructure" I mean real infrastructure — factories, hospitals, water treatment plants, power-generation facilities, roads and bridges — not the Internet. Anything short of this is merely criminality, and the use of the word "war" is disingenuous and naively dangerous in a world where we had better understand the difference.

Anon

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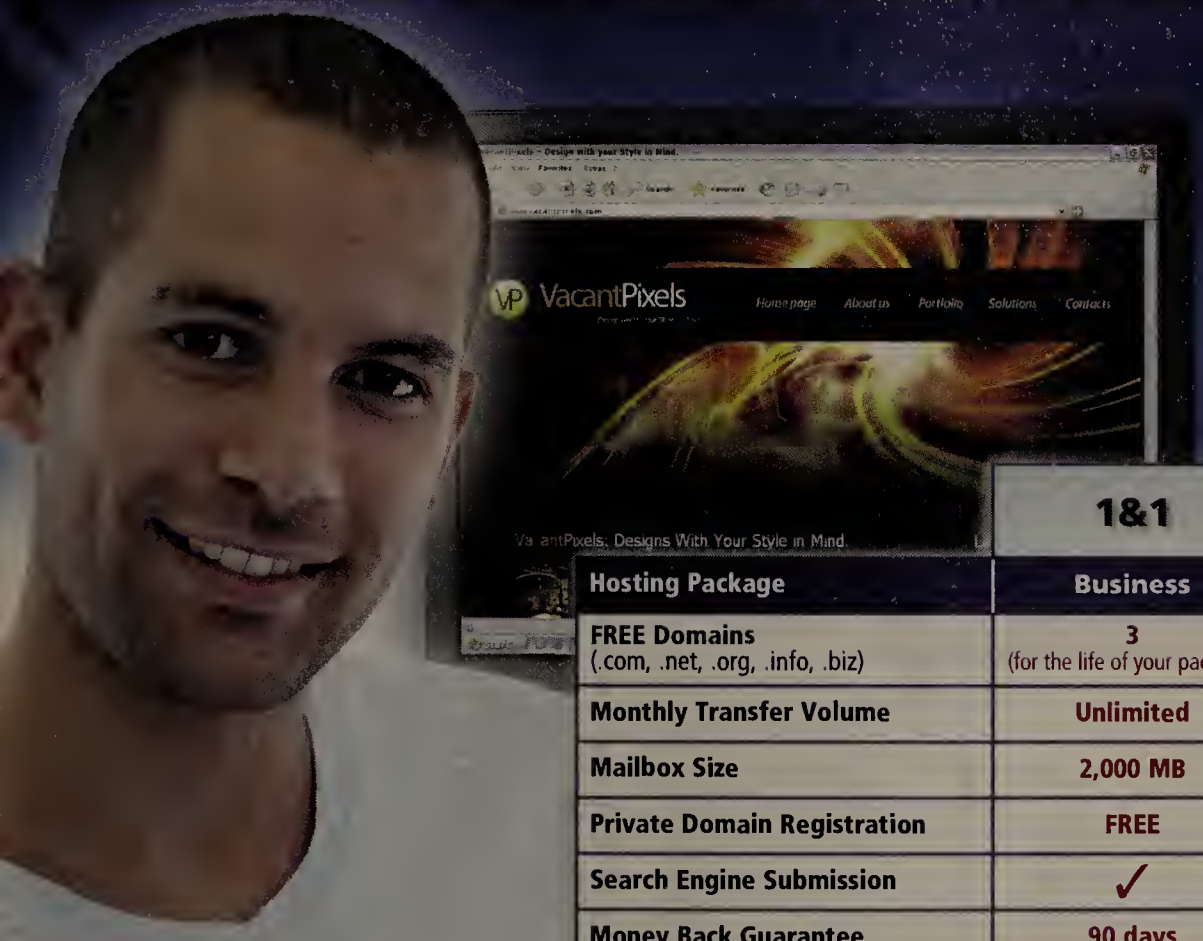

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Greenpeace rains on the cloud

EVEN GREENPEACE CAN'T resist the urge to start calling everything a cloud. A new report from the organization warns that the growth in cloud computing will be accompanied by a sharp rise in greenhouse gas emissions, and calls on big companies such as Facebook, Yahoo and Google to do more to help the environment. Greenpeace estimates that the electricity consumed by the world's data centers and telecom networks — which it calls "the main components of cloud-based computing" — will triple between 2007 and 2020. It wants Internet companies to do more to influence the supply of renewable energy available. "Ultimately, if cloud providers want to provide a truly green and renewable cloud, they must use their power and influence to not only drive investments near renewable energy sources, but also become more involved in setting the policies that will drive more rapid deployment of renewable electricity generation economy-wide, and place greater R&D into storage devices that will deliver electricity from renewable sources 24/7," Greenpeace said. Sure. OK. But did you have to call it cloud? ***tinyurl.com/ykbvm3f***

Guarding the grid

WE'RE ONE step closer to deploying cyber-guards for the nation's electric grid. The U.S. Department of Energy has officially opened the bidding for the creation of a National Electric Sector Cyber Security Organization that would protect the grid from attack. The DOE says an independent organization is needed to identify infrastructure vulnerabilities and threats, set R&D priorities, and enhance the security of the grid's control and IT systems. ***tinyurl.com/ydq8ypt***

Nehalem all about memory

GET READY for servers that tap the enhanced memory features of Intel's new Xeon 7500 processors featuring the Nehalem Next-Generation Microarchitecture. The 7500 includes up to eight cores and is targeted at high-end applications such as databases and real-time business intelligence, demanding apps that can take advantage of the processor's faster memory access. Intel has put four memory channels in Nehalem-EX processors to increase memory bandwidth, and servers can include separate buffered memory chips to temporarily store data alongside the main memory for faster execution. "The increased memory capability is huge" because it "really does open up more applications," says Jim McGregor, chief technology strategist at In-Stat. IBM, NEC and Dell have all come up with new server designs to take advantage of the processors. ***http://tinyurl.com/yas33ce***

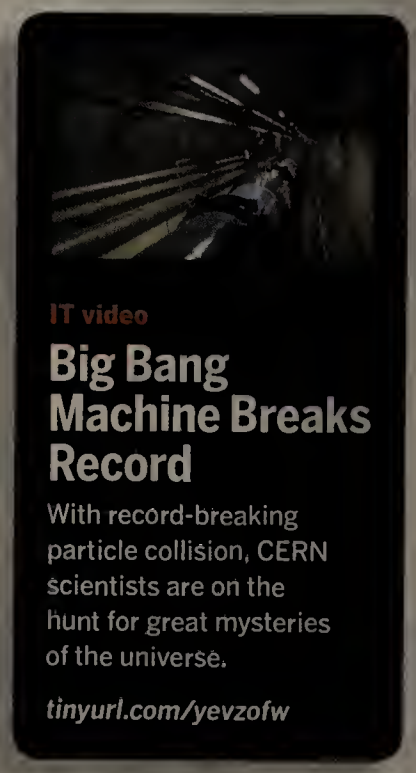
Veteran IT consolidator joins DoD

IT CONSOLIDATION appears to be on tap at the Department of Defense, if the Obama administration's appointment of California state CIO Teri Takai to the top IT job at the agency is any indication. President Obama appointed Takai assistant secretary for networks and information integration at the Defense Department. Before taking the top California IT job in 2007, Takai held the same job in Michigan's state government, where she led an effort to centralize IT operations — closing several dozen data centers and consolidating 40 statewide e-mail systems into two. Takai was given similar marching orders in California, where Gov. Arnold Schwarzenegger early last year unveiled plans to consolidate the state's IT operation under the office of the state CIO. The approach applied by Takai in Michigan and California is in line with the White House goal of holding back on IT spending increases while consolidating IT operations. ***tinyurl.com/yz7njr8***

TERI TAKAI

What can Brown do with $1 billion?

UPS WILL make about $1 billion in technology investments this year to improve the efficiency of



IT video

Big Bang Machine Breaks Record

With record-breaking particle collision, CERN scientists are on the hunt for great mysteries of the universe.

tinyurl.com/yevzofw

WHAT'S the BUSINESS PROBLEM?

GOING AROUND IN CIRCLES

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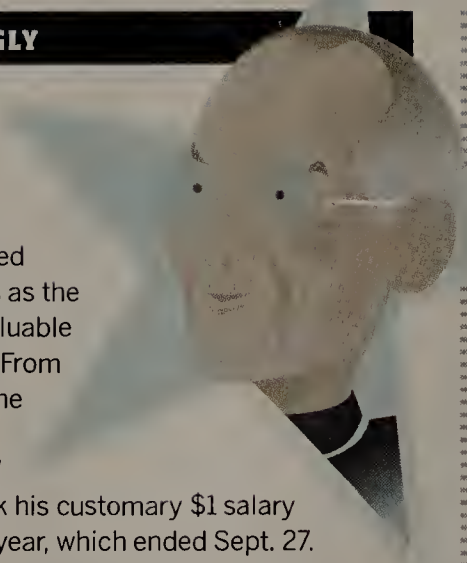
Steve Jobs: MVC



good

BARRON'S HAS named Apple's Steve Jobs as the "World's Most Valuable CEO" because "From iPods to iPads, he mints money for shareholders." What's more, Jobs took his customary $1 salary in Apple's 2009 fiscal year, which ended Sept. 27.

MCAFEE: 'AMATEUR' malware not used in Google attacks

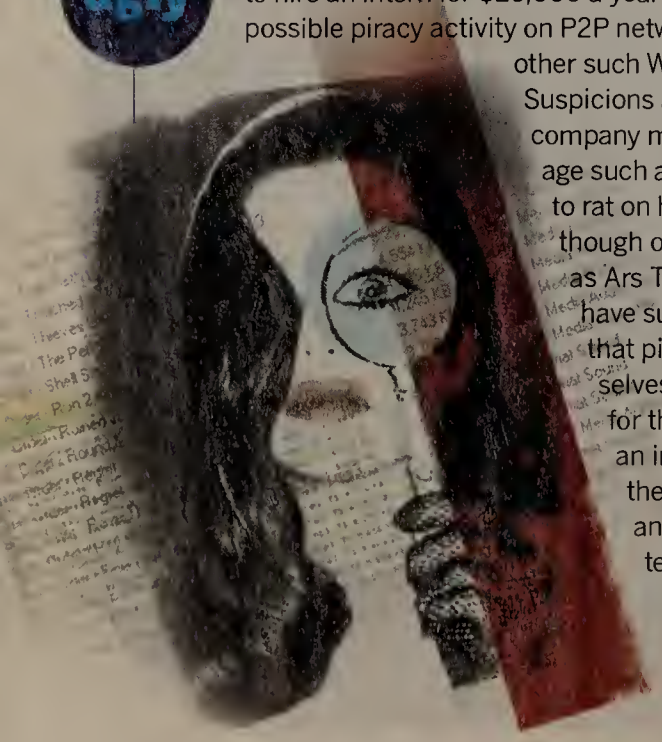
A MISSTEP by McAfee security researchers apparently helped confuse the security research community about the hackers who targeted Google and many other major corporations in cyber attacks last year. McAfee disclosed that its initial report on the attacks, branded Operation Aurora by McAfee, had mistakenly linked several files to the attacks, files that had nothing to do with Aurora after all. Aurora is a sophisticated spying operation, set up to siphon intellectual property out of major corporations. It has been linked to attacks on Google, Intel, Symantec, Adobe, and other companies. The files mistakenly linked to Aurora in McAfee's initial research are actually connected to a still-active botnet network of hacked computers that was created to shut down Vietnamese activists.

bad

P2P SNITCH wanted

ugly

WARNER BROS. in the United Kingdom is taking some heat from Web watchers over its plans to hire an intern for $26,000 a year to sniff out possible piracy activity on P2P networks and other such Web spots. Suspicions are that the company might encourage such an intern to rat on his friends, though others such as Ars Technica have suggested that pirates themselves could apply for the job to get an inside look at the company's anti-piracy techniques.



TRUE FACT

Internet activity we're most concerned about.

Online banking

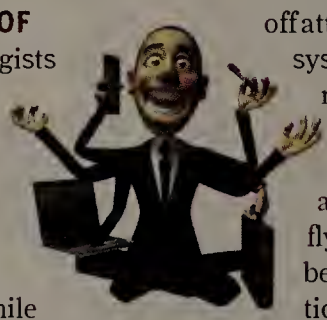
34%

SOURCE: VERISIGN'S "INTERNET TRUST INDEX REPORT", MARCH 2010

its operations, with the goal of cutting billions more from its costs over the long term, according to CIO Dave Barnes. One of its main goals is to improve the speed and efficiency of its delivery operations. To achieve that, UPS is installing around 200 sensors in vehicles — in places such as the brakes, engine box and on the exterior — to collect data and pinpoint opportunities where drivers can adjust their driving to maximize fuel efficiency. The company is also investing in more efficient cooling technologies at its two data centers, which are in Mahwah, N.J., and Alpharetta, Ga. The climates there are relatively cool in winter, so during that period the company can shut off its chiller equipment and use outside air for cooling. ***tinyurl.com/***

It's a bird, it's a plane... it's Supertasker

UNIVERSITY OF Utah psychologists say that only 2.5% of the population — what they call "supertaskers" — can drive safely while yapping on a hands-free cellphone. Jason Watson and David Strayer studied 200 folks on a driving simulator looking at factors such as braking reaction time. "Given the number of individuals who routinely talk on the phone while driving, one would have hoped that there would be a greater percentage of supertaskers," Watson says. "And while we'd probably all like to think we are the exception to the rule, the odds are overwhelmingly against it. In fact, the odds of being a supertasker are about as good as your chances of flipping a coin and getting five heads in a row." Tails, you lose. ***tinyurl.com/yef4x6v***



Apps take a licking and keep on ticking

RESEARCHERS LED by the Massachusetts Institute of Technology and funded by the Defense Advanced Research Projects Agency have developed software that keeps applications running while fending off attacks. The ClearView system detects attacks by noting when applications perform outside their normal range, then tries a variety of patches on the fly and chooses the one that best returns the application to normal. What sets ClearView apart from other attack-mitigation schemes is that programs don't stop running while patches are chosen and put in place, so users can continue to work, says Martin Rinard, the lead researcher on the project. During testing, ClearView underwent attacks designed by a team from security contractor SPARTA. ClearView fixed the application in 70% of the cases in the first phase, and in 92% of the cases in the second phase, Rinard says. ***tinyurl.com/yhptsjg***

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Customers eye desktop virtualization

BY JON BRODKIN

THE GROWING maturity of virtual desktop technologies and customer interest in Windows 7 has virtual desktop infrastructure vendors expecting big adoption numbers in 2010. But while most CIOs are at least thinking about desktop virtualization, this year's projects may be limited to pilots and small deployments because of up-front costs and technology challenges that hamper user experience.

An ITIC survey of more than 800 businesses worldwide shows that 31% of respondents plan to implement VDI this year, more than double the previous year. A related technology, application virtualization, is also on the upswing with 37% of respondents planning implementations, an increase from 15% the previous year. Likewise, Gartner has found that 33% of organizations plan to deploy hosted virtual desktops in 2010.

The flip side to those numbers is that about two-thirds of customers either won't deploy desktop and application virtualization this year, or are undecided. There's good reason for that, says Burton Group analyst Chris Wolf.

"The ROI case for virtual desktops [over three to five years] is break-even at best right now," Wolf says. "Contrary to what vendors are claiming, the ROI isn't there for a large-scale, server-hosted virtual desktop deployment." (See related story: 5 virtual desktop pitfalls at http://tinyurl.com/yhqhrkq.)

Some early adopters say they have saved money by prolonging the life of PCs or using less expensive thin clients, and that hosting desktop images in the data center improves manageability and makes it easier to restore an employee's desktop in case of device failure.

But moving desktop images and applications from a user's hands to the data center requires a major shift in both IT infrastructure and mindset. Network director John Turner of Brandeis University in Waltham, Mass., has embraced server virtualization but is still skeptical about the technology's counterpart on the desktop. If a server goes down, users can probably still connect to the Internet and get work done. But "if a desktop shuts down, it's a whole different story," Turner says. "Folks will be dead in the water." VDI also requires significant IT staff training, he says.

But with many businesses planning to upgrade to the Windows 7 operating system, IT departments are taking a closer look at virtual desktop models. Vista never really caught on the way XP did, but Windows 7 is another story.

"Windows 7 is definitely a catalyst," Wolf says. "It's a good operating system certainly, but with the pending XP end-of-life in another four years, there are a lot of enterprises planning their next-generation desktops. They understand they have to retool their desktop infrastructure. That's causing them to put everything on the table, including desktop virtualization."

Wolf believes 2010 will be the year enterprises "kick the tires," and start small pilots. But even those who adopt desktop virtualization aren't likely to virtualize their entire desktop infrastructures right away, he says. "In terms of wholesale virtualization of the desktop, I don't think we're anywhere close at this point," Wolf says.

VDI APPEAL

33%

of organizations plan to deploy hosted virtual desktops in 2010.

SOURCE: GARTNER RESEARCH

The typical CIO has a "dose of skepticism," says Phil Grove, global director of end user services at CSC, an IT outsourcing firm. "There are not a lot of people doing it at scale yet."

There are numerous models for enterprises to consider within the desktop virtualization realm. There's presentation virtualization, which executes applications on a server and remotely presents the application interface to a user's endpoint device, according to Burton Group.

VDI is generally synonymous with server-hosted virtual desktops, but is slightly different than presentation virtualization. Server virtualization is typically the back-end platform for VDI, with each desktop running inside an isolated server-based virtual machine.

Other forms of desktop virtualization include blade PCs and client-hosted virtual desktops. A blade PC runs in the data center and can be accessed remotely by client devices, but each blade PC can only serve one user at a time.

Client-hosted virtualization, on the other hand, puts the desktop hypervisor on the desktop machine itself, requiring a more robust client device but also providing better options for offline access. Client-hosted virtualization is becoming popular with organizations that let employees bring their own PCs to work, Grove says.

You can also expect some cloud-hosted desktop offerings to emerge. The vendor Virtual Bridges has taken a step in this direction by offering hosted virtual desktops running in Rackspace data centers.

VMware and Citrix have run into roadblocks in their plans to build bare-metal hypervisors — virtualization software that runs directly on system hardware instead of on top of a host operating system — for desktop PCs. But both companies, as well as Microsoft, are staying busy on the desktop front.

VMware recently upgraded its ThinApp application virtualization software to improve migration of applications from older versions of Windows to Windows 7. Microsoft, meanwhile, has lowered the price of licensing the Windows operating system in virtual desktop deployments, and announced new bundles with Citrix designed to lure customers away from VMware.

Specifically, Microsoft and Citrix offer a year's worth of free desktop virtualization for as many as 500 users for companies that switch from VMware View to Citrix's XenDesktop VDI and Microsoft VDI.

Whether a customer opts for VMware, Citrix or Microsoft on the virtualization side, upgrades in Windows 7 will increase the viability of virtual desktop deployments, experts say.

IT manger Dan Powers of Cox Communications in Omaha, Neb., who runs VMware View and is testing Windows 7 for a potential upgrade, says Windows 7 desktop images can be built in a modular fashion, making them less data-intensive. Whereas Cox's XP images are 10GB apiece, a Windows 7 desktop image can be 2GB or even less.

"It's a modular approach to building your desktop," he says. Whereas XP is "an all-or-nothing deal," Windows 7 desktop images allow Powers to strip out unnecessary components, he says. "I don't ned this big, bloated operating system anymore." ■

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How Google wants to change telecom

BY BRAD REED

GOOGLE SAYS it doesn't want to be your Internet service provider; rather, it wants to make your ISP behave in a more Google-friendly manner.

This is why, over the past several years, the Internet search giant has used its financial clout and the strength of its brand to make regular forays into the telecom industry. From lobbying for net neutrality legislation to developing its own mobile phone and operating system to creating an experimental high-speed broadband network, Google hasn't been shy about throwing its weight around on the carriers' turf.

And what does Google want from all this? Essentially it wants to give carriers less control over what they can and cannot do with their networks. For instance, one goal of the Android platform was to get carriers to be less strict about what applications and content they will allow to run over their wireless networks. Net neutrality, meanwhile, will prevent carriers from giving priority to their own content over the content of rival ISPs and Internet companies.

Here we take a look at Google's major telecom initiatives while breaking down their overarching goals and the level of success they have achieved.

1. Net neutrality

PURPOSE: Google isn't fighting this particular battle alone as several Internet companies and consumer groups have been advocating for net neutrality rules over the past five years. The push for net neutrality began in 2005, when incumbent telecom carriers successfully lobbied the Federal Communications Commission to repeal common carrier rules that required the incumbents to allow ISPs such as EarthLink to buy space on their broadband networks at discount rates. Both the Web companies and consumer groups feared that this would lead to a small handful of large ISPs consolidating power over Internet access, thus giving them the power to slow or degrade competitors' traffic.

Or as Harold Feld, the senior vice president for the open media advocacy group Media Access Project, explained to *Network World* last year, "Before 2005 we didn't need [net neutrality] because we had a separation rule where carriers had to sell access to their underlying network. AT&T and Verizon were never allowed to touch EarthLink's DSL operation."

So in lieu of bringing back common carrier rules for telcos and cable companies, the Web companies began pushing for net neutrality regulations as the next-best solution. Broadly speaking, net neutrality is the principle that ISPs should not be allowed to block or degrade Internet traffic from their competitors in order to speed up their own. The major telcos have uniformly opposed net neutrality by arguing that such government intervention would take away ISPs' incentives to upgrade their networks, thus stalling the widespread deployment of broadband Internet.

Google telecom by the numbers

Some key figures that illustrate Google's interest in telecom

$6 million The amount of money Google spent lobbying the federal government on various legislation last year, including net neutrality rules.

$60 million — $1.6 billion Broadpoint AmTech's estimate of how much Google's experimental fiber network could cost.

1,100 The number of communities that have applied to host Google's new fiber network.

3 million ComScore's estimate of how many Android-based phones have been sold in the United States.

RESULTS: As far as Google is concerned, so far, so good. Last fall FCC Chairman Julius Genachowski proposed two new rules to commission policy that would bar carriers from blocking or degrading lawful Web traffic and that would force carriers to be more open about their traffic management practices. The battle isn't yet over, however, as both Verizon and AT&T have been actively fighting final commission approval of the two rules. The carriers have argued that restricting their ability to favor certain content and to create tiered services would take away their financial incentives to invest in network upgrades. Additionally, the carriers have successfully lobbied several politicians, including Arizona Sen. John McCain, to try to block the FCC's proposed net neutrality rules before they are even voted on by the commission.

2. Android and the Google Nexus One

PURPOSE: The Android operating system and the Nexus One smartphone are both part of Google's vision of having wireless devices that aren't tied down to any particular network. In other words, Google wants users to eventually be able to take their favorite devices with them from one carrier to another without having to buy a whole new device.

The first part of implementing this vision came in 2007, when Google unveiled its long-awaited Android open source mobile operating system. At the time of the platform's release, Google said it wanted Android to be a starting point for spurring innovation in developing mobile applications that would give users the same experience surfing the Web on their phone as they currently have on their desktop computers. In the two-plus years since its debut, Android has landed on several high-profile devices, including the Motorola Droid, the HTC myTouch 3G and the Samsung Moment. Now that the Motorola Backflip has debuted on AT&T's network, all four major carriers in the United States support Android-based devices.

But while Android phones clearly generated a lot of market hype over the past two years, they have also largely been tied to exclusivity agreements that make their use dependent on individual carriers. With this in mind, Google late last year launched its own Nexus One smartphone, which will run on both the T-Mobile and Verizon networks. The Nexus One doesn't, however, mark any intention by Google to get heavily involved in the handset market. Rather, the company is using the Nexus One as a showcase for the Android platform's potential when running on a device that has the most cutting-edge hardware and software available on the market.

RESULTS: By all accounts, Android has been a big hit so far. The number of Android-based devices grew at a rapid clip during the fourth quarter of 2009 and Android phones now account for just over 7% of all smartphones sold in the United States.

As for the Nexus One, we aren't likely to see its full impact until it makes its debut on the Verizon network sometime this spring. However, just because both T-Mobile and Verizon

NETINSIDER | BY SCOTT BRADNER

SCO Group: Die Hard 17

ALMOST TWO years ago I wrote in this column that the SCO Group's future was all used up. Sorry to say, just like a cliche movie character, it has turned out that the SCO Group does not die easily. But the end may finally be getting closer with this week's jury ruling in favor of SCO Group adversary Novell.

It is now almost seven years since the SCO Group gave up on the idea of actually producing good products and hitched its future to suing others. In my first column on the topic I predicted that someone would pay off the SCO Group, but it turned out that no one was willing to hold his nose long enough to do so. Well, almost no one: it may be that Microsoft provided SCO with some funding. But maybe this was like two skunks mating — maybe Microsoft could not smell the stink since it has frequently threatened the same kind of attacks on Linux using secret information that the SCO Group was known for.

For those of you who achieved consciousness since this process started, the SCO Group filed suit against IBM, claiming that IBM stole mountains of Unix code and put it in Linux and wanting billions of dollars in compensation. It also threatened various companies that were using Linux. The SCO Group claimed that it just wanted to protect its intellectual property rights but, naturally, refused to tell anyone exactly what in Linux was stolen code. In other words, the SCO Group was in it for the money — everything else was window dressing. If open source software, including Linux, had to die to enrich the SCO Group, so much the better.

A not so minor problem developed for the SCO Group when Novell said that it had never transferred the Unix copyrights to the SCO Group. If that were the case, the SCO Group would have no rights to claim in its suit against IBM. In response, the SCO Group started throwing lawyers at Novell — and sued Novell for Novell's claim.

In mid-2008 I wrote the column referred to first paragraph because a judge had ruled that Novell was right and that the SCO Group had no rights with which to threaten the world. It looked like we had entered the SCO Group's end game, but it threw some more lawyers and appealed.

Another judge ruled that a jury should decide if Novell was right, which led to a three-week jury trial in Salt Lake City. That jury ruled this week that Novell was right in saying that the Unix copyrights had not been transferred.

This should be the end. If the SCO Group has no rights it cannot continue the suit against IBM. In addition, the SCO Group declared bankruptcy and is just about out of money. But, legally, a lawsuit is not over until any appeals are decided, and where there is a lawsuit, there are lawyers who may be willing to take a chance on an appeal — particularly if any of them still thinks there could be billions of IBM dollars and other billions of Linux users' dollars there for the picking.

I do hope that this is my next-to-last column on the SCO Group. The last column will be to celebrate the lack of yet another sequel in this string of movies, each of which has started like a horror flick and ended on an upbeat note.

Disclaimer: I expect that Harvard, for some students, starts like a horror flick and ends, on commencement day, on a upbeat note but I know of no university opinion on the past ability of the SCO Group to rise, zombie like, from repeated near-death experiences. So the above non-movie review is mine alone. ■

Bradner is Harvard University's technology security officer. He can be reached at sob@sobco.com.

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will be supporting the Nexus One, don't think that you can merely cancel your subscription to one of the carriers and bring your device onto another network. Since Verizon uses the CDMA-based EV-DO Rev. A 3G technology and T-Mobile uses the GSM-based HSPA 4G technology, Google has had to design two different Nexus One devices that will be compatible with each network. So basically, don't set your sights on carrier-hopping until Google comes out with a 4G phone that can run on Long-Term Evolution, the GSM-based 4G technology that has been adopted by T-Mobile, AT&T and Verizon.

3. The experimental broadband network

PURPOSE: This could be Google's most audacious project to date, as the company announced last month on its blog that it is constructing an experimental fiber network that it says will "deliver Internet speeds more than 100 times faster than what most Americans have access to today with 1 gigabit per second, fiber-to-the-home connections."

This project is unlikely to threaten the big ISPs' bottom lines since Google says it plans to only offer access to the network in "a small number of trial locations" and that it will serve anywhere from 50,000 to 500,000 people. But much like its efforts with Android and the Nexus One, Google's plan to deploy a high-speed fiber network is less about competing directly with incumbent companies and more about pushing incumbent companies to change how they operate.

Or put another way, Google is trying to pressure carriers to step up their games and hasten their plans to build out more high-speed networks. With typical broadband speeds lagging behind those in countries such as South Korea and Japan, Google is seemingly trying to give U.S. carriers a kick in the pants by saying, "If we can build a network this fast that serves large numbers of people, so can you." And what's more, the Google network will be open access, meaning third-party service providers will be able to use it to deliver Internet to their customers. In this way, Google is trying to bring back discarded common carrier rules by showing that it's possible to have a strong and successful fiber network that third-party service providers can use to wholesale access to subscribers.

RESULTS: The limited scope of the network means that it could easily be brushed off as an interesting novelty that would make an unrealistic model for a nationwide high-speed fiber network. Even so, the mere fact that the Google brand is behind the new network — and the fact that Google's other telecom initiatives have had a good level of success so far — means that the network's development and implementation will garner plenty of industry attention. ■

The Internet's hidden quirks

At IETF meeting, a peek at the 'Net's infrastructure reveals hidden oddities, threats

BY CAROLYN DUFFY MARSAN

ANAHEIM, CALIF. — The world's leading Internet engineers see many surprising trends occurring under the covers of this complex network environment. Among their findings are the evolution of silicon cockroaches — tiny, mobile, unattended wireless devices — and "dirty" Internet address space that can't be used by network operators. Here are a few eye-openers about what's really going on in the Internet infrastructure that were discussed at a meeting of the Internet Engineering Task Force (IETF) held in Anaheim last week.

Watch out for SILICON COCKROACHES.

Network operators should prepare for an infestation of silicon cockroaches, a term used to describe Internet-connected devices such as mobile sensors, biomedical systems and RFID-powered asset trackers that operate without human administration.

Aaron Falk, chair of the Internet Research Task Force, listed silicon cockroaches as a key factor in the Internet becoming a network of things, rather than a network of computers, in the future. Falk said 15 billion devices could be hooked up to the Internet by 2015, a figure that will be "orders of magnitude bigger" than the number of Internet-connected people. Silicon cockroaches pose several threats to network operators, including naming, security and management headaches that require additional research, Falk said.

Internet's THIRD-LARGEST CARRIER is Google.

If you thought Internet traffic was carried by, well, carriers, think again. In 2009, Google became the third largest global transit carrier on the Internet, according to Craig Labovitz, chief scientist at Arbor Networks. Labovitz said Google carries between 6% and 10% of the Internet's traffic, due to its acquisition of YouTube and its massive build-out of data centers. Arbor Networks came up with this figure based on a two-year study that involves monitoring more than 110 ISPs and content providers representing 25% of the Internet's inter-domain traffic. Labovitz said Google is helping change the topology of the Internet by creating a flatter, more densely interconnected Internet.

FAREWELL to peer-to-peer.

The era of BitTorrent, Kazaa, iMesh and other peer-to-peer (P2P) networking services appears to be ending, according to the Arbor Networks study of Internet traffic trends. The study measured P2P traffic as a percentage of overall Internet traffic and found that it declined more than 70% between 2007 and 2009. Now representing less than 1% of Internet traffic, P2P is the fastest-declining application on the Internet. The most popular applications are Web, video and VPN services. As video downloads rise, network operators are seeing more traffic entering their networks via Port 80, Labovitz said.

WARNINGS of an exaflood were exaggerated.

Internet traffic is growing at the rate of 45% a year, according to the Arbor Networks study. Labovitz called this growth rate "significant," but said it doesn't approach an exaflood level. Exaflood is a term coined in 2006 to refer to projected growth rates of Internet traffic that would be 50 or 100 times bigger than it is today. The Arbor Networks study estimates the Internet's total inter-domain traffic volume per month was a large-but-manageable 9 exabytes in 2009.

Should Teredo be TERMINATED?

Teredo is a tunneling mechanism that was designed to help transition the Internet from IPv4, the current version of the Internet Protocol, to the long-anticipated upgrade known as IPv6. Teredo encapsulates IPv6 packets inside IPv4 packets for transit over network address translation devices and IPv4 backbone networks.

The latest Internet statistics show only a trickle of Teredo traffic. This is despite the backing of Microsoft, which built Teredo capabilities into Windows XP, Vista and Windows 7, and Hurricane Electric, which operates a Teredo relay service. Geoff Huston, chief scientist at APNIC, estimates that Teredo represents only 5% of IPv6 tunneling traffic, down from as much as 20% in 2008. An alternative tunneling mechanism known as 6to4 is gaining in popularity, with Comcast seeing a 500% increase in 6to4 traffic in the last 30 days.

"The folks doing 6to4 tunneling as a percentage of IPv6 folks is increasingly rapidly, while the number of folks doing Teredo is really low," Huston said. "I'm not sure we need [Teredo.]" Huston estimates that tunneling of IPv6 traffic inside IPv4 packets represents around 10% of IPv6 sessions.

How much remaining IPv4 ADDRESS SPACE IS "DIRTY?"

One topic that's coming up in the IPv6 community is the prevalence of "dirty" IPv4 address space, which refers to unallocated prefixes that are used by various organizations to number their internal networks. Marc Blanchet, an IPv6 expert with consultancy Viagenie, says that of 24 unallocated prefixes he reviewed, 22 were "dirty" and only two were "clean." The worry is that if a network operator starts broadcasting one of these "dirty" IPv4 prefixes, users will be shut off from sites and networks that use that prefix internally. The issue is important given that the Internet is expected to run out of IPv4 address space by 2012. The regional Internet registries said in January that less than 10% of IPv4 addresses remain unallocated.

Sweden: NOT AS SECURE as you think.

Sweden has been considered a leader in DNS security since 2006, when it became the first country to support DNS Security Extensions (DNSSEC) on .se, its country code top-level domain. DNSSEC prevents hackers from redirecting Web traffic from a legitimate Web site to a fake one by adding a layer of encryption to the DNS.

However, the largest domain name registrars in Sweden are not supporting DNSSEC, admitted Patrik Faltstrom, a DNSSEC expert and long-time IETF participant.

"The banks in Sweden are not signing their names," Faltstrom said, adding that only 2% of .se domain names are signed. "The pick-up rate in Sweden has been very, very slow....Only governments and regulators are jumping in."

The Czech Republic has the highest number of signed domains with its .cz domain, Faltstrom says. The Czech Republic began supporting DNSSEC in 2009. ■

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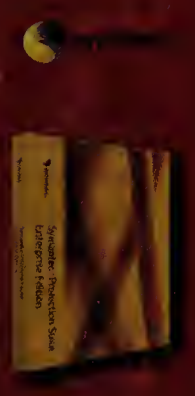

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▶ **Endpoint,** *from page 1*

For instance, Wyoming Medical Center in Casper, has four classifications of PCs — open PCs in hallways for staff use; PCs at nursing stations; PCs in offices; and PCs on wheels that move between patient rooms and handle specific, limited applications, says Rob Pettigrew, manager of technical systems and help desk for the center.

Pettigrew is deploying Novell ZenWorks to 850 of the center's 900 PCs in order to make sure each class has the right software. With 110 applications and 40 major medical software systems that makes a huge matrix of machine types and restrictions to contend with, he says.

In addition, physicians in affiliated clinics can access via SSL VPN, but they are limited to reaching Web servers in a physician's portal that is protected from the hospital data network. Some Citrix thin-clients are also used to protect data from leaving the network, but overall the strategy for unmanaged machines is a work in progress, Pettigrew says.

One concern that can be addressed by endpoint security is data privacy, which is paramount for the Los Angeles County Department of Health Services in California, says Don Zimmer, information security officer for the department. He supports about 18,000 desktops and laptops and operates under the restrictions of Health Insurance Portability and Accountability Act regulations. That means disk encryption, he says.

"If it's not encrypted and there is a breach, then we have to start calling people," he says. To avoid violating patients' privacy and a loss of public trust the department encrypts the drives of all the PC endpoints with software from PointSec.

Equally important is keeping sensitive information off movable media that can plug into USB ports. The department uses Safend's USB Port Protector product that either denies access to sensitive documents or requires that they be encrypted and password-protected before being placed on the removable device.

Zimmer says he is looking into data-loss prevention software as well that can restrict the access individual devices have to data. While the technology can be effective, it also requires that businesses locate and classify their data so they can set policies surrounding it — a job that can seem insurmountable depending on how data has been stored.

For Pettigrew, this means finding the 5% of sensitive data stored outside the medical center's electronic medical records system.

Rather than deal with many vendors for specific endpoint protection products, some businesses opt for endpoint security suites, such as those that evolved from the antivirus roots of vendors McAfee and Symantec.

Sam Ghelfi, CSO at financial firm Raymond James, opted for Sophos' Endpoint Protection and Data Security Suite, which offers firewall, antivirus, data-loss prevention, antispyware, encryption and network access control (NAC). The company wants tight control over what Web content is available to users to minimize the malware coming in via basic Web browsing. The company uses a Sophos Web proxy to filter sites based on reputation but also the content that sites return.

Mobile devices that could contain confidential company information are disk encrypted, again using Sophos agents. If a device is lost or stolen, the encryption key is wiped out making it impossible to decrypt the contents of the hard drive.

Ghelfi says he believes in personal firewalls on individual machines because they can stop groups of devices from talking to other groups. Centrally managed, they can reveal network traffic patterns, he says.

He doesn't use all the features of the Sophos suite, though. For instance, he is just getting around to implementing NAC to let unmanaged guest machines get on the network but still minimize risk that they are infected.

That will clear them based on authentication, access method and type of machine, but for contractors that require access to the main network, he also insists that they install the Sophos suite. Other unmanaged machines such as those of guests are allowed access only through a dedicated wireless network that leads to a limited set of servers in a network segment flanked by firewalls, he says.

Such endpoint security suites can be attractive financially, Jabbusch says, because customers can wind up with reduced agent, license and support fees and less management overhead. There may be a certain amount of convenience if customers decide to layer on more applications within a suite.

The newest class of device — smartphones — is presenting ongoing challenges. Particularly dicey is whether to allow employees to use their personally owned devices for business and to access the business network.

A Forrester Research survey says 73% of businesses surveyed are at least somewhat concerned about smartphones being authorized for business use.

Jabbusch says the type of smartphone is a factor. "I can't imagine allowing an iPhone," she says. "A BlackBerry is somewhat better," because BlackBerries have a management infrastructure and the devices can be locked down to corporate policies. ■

Dos and don'ts of endpoint security

The list of possible products that can help secure the ever-increasing number of corporate network endpoints grows and grows. It's impossible to use them all or to 100% ensure that endpoints never fall prey to attacks, so it is key to weigh the pros and cons of each product and whether it fits the environment being protected. Here are some.

	Pros	Cons
PERSONAL FIREWALL	Can lock down devices as necessary and provide valuable network traffic information via aggregated logs.	Too many rule sets across different employee groups can complicate management, and overly restrictive policies can cause user backlash.
HOST-BASED IPS	Can screen encrypted traffic because it is being decrypted at the host.	Can take a toll on host processors and maintaining distributed IPS can be a burden.
SECURITY SUITES	One vendor to deal with, integrated functionality, one dashboard, can be pricing breaks.	Rules out best-of-breed option, may pay for more features than required.
DATA LOSS PREVENTION	Provides granular control over what devices do with data, extends controls beyond the wired enterprise.	To be effective, unstructured data needs to be classified.

► **Microsoft,** *from page 1*

around technologies that many felt Microsoft attempted to control in a closed environment, according to industry watchers. For others, not much changed and Microsoft continues to capitalize on its market strengths, pummeling competition where it can.

"The potential was there to shatter Microsoft. I envisioned a whole new world as seen through my IT goggles," says Greg Topf, director of IT at NewBay Media in New York City. "I knew Microsoft was always the 800-pound gorilla. I really figured major changes would be coming, the implications from the ruling really held the potential to cause Microsoft to totally re-architect itself. Honestly, the whole change was a lot smaller than I envisioned."

The good

Microsoft, which declined to comment for this story, has lost some market share to competitive browsers, yet the company seems to be making strides with its plans around IE 9 and standardizing HTML5.

"Microsoft has shown they really want to lead the way with HTML 5 and not follow others with innovation. Their leadership here will help Microsoft deliver IE9 as a truly modern browser and demonstrates how seriously they are taking this effort," says Forrester Research analyst Sheri McLeish. "From the browser perspective, people can have multiple browsers and it is important Microsoft innovate in this technology to stay as close to customers as possible."

And Microsoft continues to dominate with its Windows operating system, holding 91% market share, according to Net Market Share, and seeing eager anticipation and accelerating adoption of the latest revision, Windows 7. According to a 2009 report by McLeish, 80% of enterprise customers use some version of Microsoft Office for productivity and collaboration, with 8% choosing alternatives. And many are anticipating adopting Microsoft Office 2010 to meet emerging needs, according to Forrester.

"Microsoft continues to leave its computing fingerprints on most desktops," McLeish says. "But the scrutiny ensured Microsoft couldn't monopolize the market so now companies like Google can also make a concerted effort to own the desktop experience from browser to application to operating system."

One positive shift that might not be apparent in market share numbers is Microsoft's commitment to interoperability with third-party and open source systems.

Rob Enderle, principal analyst at the Enderle Group, points out the company's internal R&D efforts as well as an internal Linux group devoted to Microsoft's "massive effort with interoperability." In the 1990s, Microsoft pushed its closed environment, requiring hardware makers to meet its specifications, but this century Enderle says the company realized the potential to innovate faster by working with others, even competitors.

"The DoJ and the EU served as a slap in the face to Microsoft to lift its head up and see what was happening in the world of technology outside of its R&D," Enderle says. "Microsoft in the 1990s seemed invincible, but the case allowed other products to come to market to address challenges, faster than if one company worked on them, and now Microsoft seems a bit less arrogant because if you hit someone in the pocket hard enough you will force them to change."

The bad

One thing the lawsuit didn't change was Microsoft's ambition to create a significant presence in many markets.

"Windows Mobile represents one of the tougher failures, because they just completely didn't do it right. The Zune was positioned against Apple, in an attempt to be relevant, but didn't take off as hoped," says Jonathan Edwards, research analyst at IDC.

For IT professionals, worse than misfired product efforts is the fact that little has changed with the software giant. The company, while committing in part to standards efforts, hasn't done enough for some customers.

"Microsoft still needs to learn to be less proprietary. If every software company in the world opened themselves up to standards, it would be a lot easier place to live in," says Craig Bush, network administrator at Exactech, a maker of orthopedic implant devices and related surgical instrumentation, in Gainesville, Fla. "[Microsoft] also needs to improve their ridiculously complicated licensing structures. Some of the software applications I administer are so hamstrung by the licensing that it's extremely time-consuming to work with them."

Others think that Microsoft made some headway in its browser technology, but hasn't achieved what competitors have when it comes to the user experience on the desktop. For instance, the company may offer the choice of other browsers, but Microsoft still requires IT pros tap IE to get there.

"I find it ironic to start up IE to download a new browser, kind of like saying, 'Thanks for the ride to Chrome, I'm done with you now!'" says John Turner, director of networks and systems at Brandeis University in Waltham, Mass. "Microsoft will always be suspect in that way. Every time I install a fresh copy of Windows and start IE so I can download Firefox or Chrome, I cringe at the ads and pop-ups Microsoft puts in to try to get me to stick to IE."

Naveed Husain, CIO at Queens College, a City University of New York public educational institution, says despite efforts Microsoft isn't innovating as well as competitors.

"Microsoft has slowed down, and it is now becoming the IBM of yesteryear," he says. "SharePoint and Windows 7 are now the leading products for Microsoft. There seems to be less movement on the side of innovation." ■

Microsoft through the years

The U.S. Department of Justice waged a years-long battle against Microsoft, ensuring the software giant was not partaking in anti-competitive practices, ultimately winning.

Nov. 4, 2002: The European Commission confirms plans to uphold European Union law in its own probe into Microsoft, legally separate from the U.S. case.

Nov. 1, 2002: Judge Colleen Kollar-Kotelly rules that a proposed settlement meets the requirements of public interest.

April 3, 2000: U.S. District Court Judge Thomas Penfield Jackson rules that the software giant violated antitrust laws and acted to hold onto its power over industry competitors. Microsoft immediately appeals.

Oct. 27, 1997: The Justice Department files a complaint demanding a $1-million-a-day fine against Microsoft for its alleged violation of an earlier consent decree.

Aug. 19, 1997: The Justice Department wants to determine if Microsoft's $150 million investment in Apple Computer, or its equity stakes in three companies that develop Internet streaming technologies, could squelch competition.

July 1994: Microsoft settles antitrust charges with the Justice Department, signing on to a consent decree that forbids the company from using its operating system dominance to squash competition.

Office is in.

Exchange is in.

SharePoint is in.

SQL Server is in.

Dynamics CRM is in.

Windows is in.

TOOLS

Turing machines, CAs and the universe


Mark Gibbs' Gearhead

This week we'll venture in the realm of theory for a change, starting with Turing machines. In case some of you don't know what a Turing machine is, here is the Wikipedia definition: "A theoretical device that manipulates symbols contained on a strip of tape." It is not a practical computing device, but rather "a thought experiment representing a computing machine."

And why bring this up? A guy named Mike Davey has actually built a classic Turing machine that really works (see http://aturingmachine.com)!

Unlike Turing's thought experiment, this one doesn't have an infinite tape but instead uses a 1,000-foot roll of 35mm film leader (that's infinite enough for practical purposes).

The write head that creates symbols on the tape is a black, erasable marker and erasing symbols is done by a felt pad that is lowered onto the tape when needed. The symbols on the tape are "read" by a camera and the whole apparatus is driven by a Parallax Propeller microcontroller.

The entire project, both hardware and software, is open source and I want one!

There's a type of Turing machine that most people in IT will have heard of: Cellular Automata (CA). These are computational systems based on grids that can have one, two, three or more dimensions. The cells that make up the grid have two or more states and to begin there is some starting configuration of cells in various states. A set of rules determine the next state of each cell in the grid with the resultant state being dependent on the cell's own states and the states of its neighbors (usually the states of its immediate neighbors). Normally the states of all the cells change simultaneously so time in this system moves forward in discrete steps.

For example, in the classic Conway's Game of Life, a simple orthogonal grid in two dimensions constitutes the world. The states of the eight neighbors adjacent to each cell are examined and the sum of their states determines the cell's next state. In Life the rules are very simple, but the results can be spectacular, often with complex patterns forming, moving, growing and dying.

The entire project, both **hardware and software,** is open source and I want one!

If you should want more Turing machine stuff check out the demonstrations on Wolfram Research's site (tinyurl.com/yewmzc4), the home of Mathematica, the amazing legendary mathematical computation program.

Wolfram offers a free player that will execute Mathematica Notebooks (collections of formulae that are ready to be executed) and the site offers 26 Turing machine demonstrations.

I'd also advise checking out Stephen

► *See* **Gearhead,** *page 22*

IT asked and answered

Ron Nutter and **Steve Blass** tackle your tough tech questions

I've need a load balancer that is: 1) user friendly since this will also be used by our eCommerce department; and 2) costs less than $20,000. Right now I have my eye on Coyote Point, F5, Brocade and Kemp. – a2thed

Given the importance of the eCommerce operations, I think it would be prudent to setup a test network and ask each vendor for evaluation units. I would also ask for references on the units (both good and bad), and talk to your application suppliers to see if they support any of the systems or know of configuration changes that will be needed to optimize performance. You will also want to look at how often updates are released and what is fixed. This should tell you how responsive the company is and if it tries to fix just one thing or several things at the same time. Especially when using something like this in eCommerce. Also look at the process of rolling back to a previous release of firmware in the event that the new firmware either doesn't fix the problem or creates new problems. Look at what happens during a firmware update. Does the unit fail to wire and go into bypass while the update is being processed? Load balancing systems are typically not plug and play. It may take a system engineer from the vendor to get the system up and running, so consider if the vendor can do that or if you'll need to engage its professional service folks?

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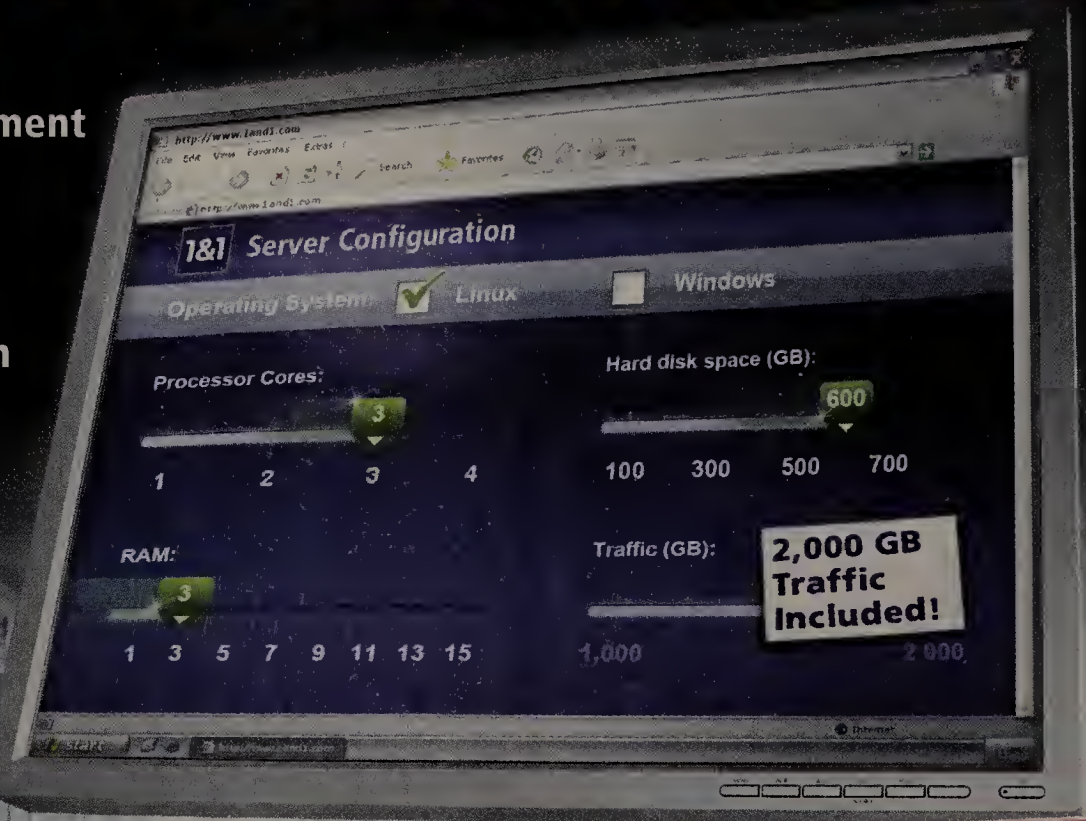

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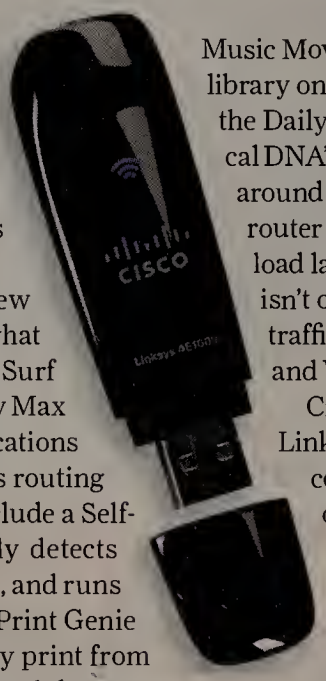
GADGETS

Home wireless vendors aim to simplify routers

Keith Shaw's Cool Tools

IF IT'S BEEN a while since you've purchased or upgraded your home wireless network equipment, you're not alone. Sales of home wireless gear have been pretty flat, leading to several theories as to the reason why. Some feel that the current technology of 802.11g and/or 802.11n products is good enough for most home setups, while others suggest that the complexity of setup prevent new users from buying and installing these products.



Whatever the reason, vendors are attempting new approaches to try to increase sales, including Cisco and Belkin. The two companies recently announced products to address some of these issues.

Belkin designed its four new routers around the concept of what users do with the devices — the Surf ($50), Share ($80), Play and Play Max Wireless Routers include applications in addition to the basic wireless routing functions. All of the routers include a Self-Healing app that automatically detects and resolves network problems, and runs routine maintenance scans. A Print Genie application lets users wirelessly print from any computer on the network, and the Memory Safe application can automatically back up files to a separate external hard drive.

The higher-end Play ($100) and Play Max ($130) versions, which include dual-band 802.11n technology, are aimed at users who want to stream HD movies, play games online and download large media files. Applications on the Play and Play Max include: the Music Mover, which lets you play your music library on the Xbox 360 or Playstation 3; and the Daily DJ app, which analyzes the "musical DNA" of your music and creates playlists around three different moods. The Play Max router also includes Torrent Genie (download large media files when the computer isn't on), and Bit Boost, which prioritizes traffic on the network for video, gaming and VoIP traffic.

Cisco last week launched a line of Linksys wireless routers. To address the complexity issue, Cisco's Valet series offers users an easier way to set up their home networks. The Valet systems come with a USB "Easy Setup Key" that users plug into their PC or Mac, and the new Cisco Connect software sets up the system in three steps. Settings are stored on the USB key, which then connects to other PCs to add them to the network. The software also provides parental controls and the ability to set up Internet access for guests.

Two versions are available — the Valet costs $100 and is aimed at small or midsize homes with mostly wireless clients; the Valet Plus costs $150 and is aimed at homes with a mix of wireless and wired clients. The Valet Connector ($80) upgrades older computers to the new network.

For tech enthusiasts, Cisco also announced its E Series of routers, ranging from the E1000 ($80), the E2000 ($120) and the high-end, dual-band E3000 ($180). The company also announced the E2100L, which includes a Linux operating system. All of these routers will also include the new Cisco Connect Software. ■

Cisco's new line of Linksys wireless routers includes a variety of form factors.

Shaw can be reached at kshaw@nww.com. Follow him on Twitter at http://twitter.com/shawkeith.

TRUE FACT

64%

The percentage increase from 2008 to 2009 in the number of U.S. homes using Internet-connected game consoles.

SOURCE: PARKS ASSOCIATES

▶ **Gearhead,** *from page 20*

Wolfram's 2002 book, "A New Kind of Science", wherein Mathematica's creator argues that "it is possible to view every process that occurs in nature or elsewhere as a computation."The science of Turing machines is at the heart of this work.

This treatise is heady stuff and, should you opt to buy Wolfram's book rather than peruse it online, make sure you keep a firm hold of the tome; at 1,197 pages it could cause serious damage to your toes if dropped.

To end this week, I leave you with some speculative physics based on the idea of CAs and which is firmly in Wolfram's theoretical territory: The idea that universe is actually one vast cellular automaton.

This theory was proposed in 1967 by Konrad Zuse, who also designed the first high-level programming language and formed a very early computer company in 1946 funded by patents licensed to the then very young IBM.

I shall leave you to follow that rabbit hole, wherever it might take you. ■

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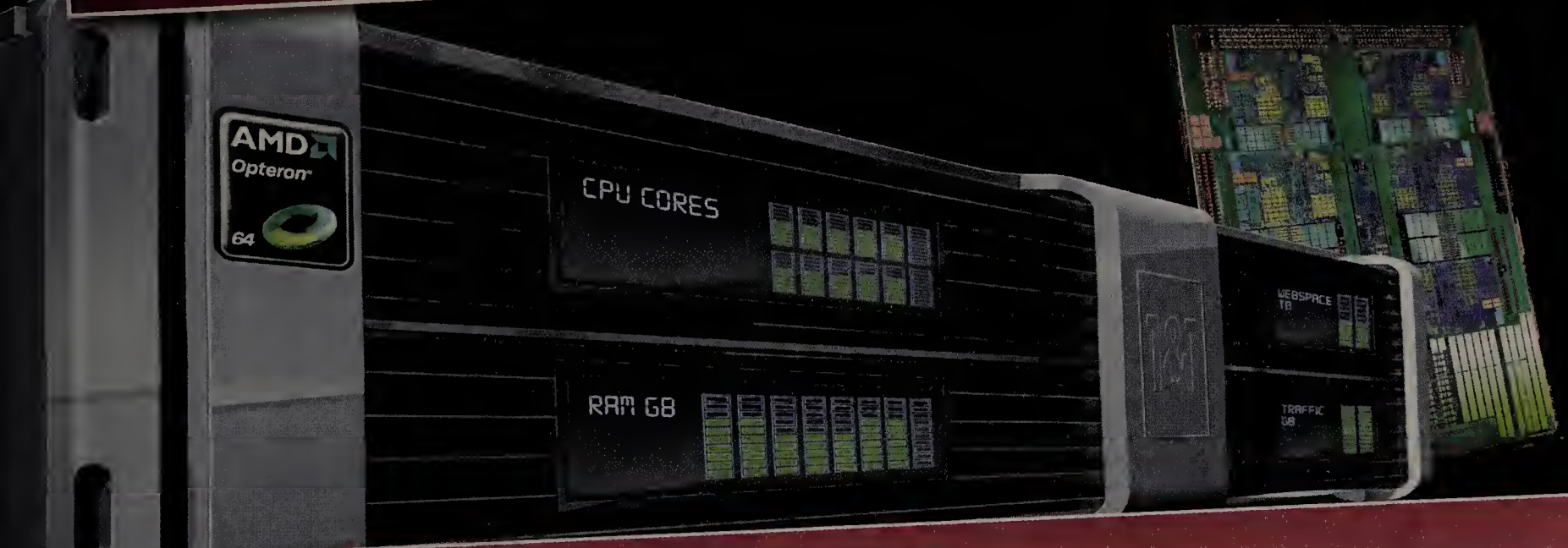

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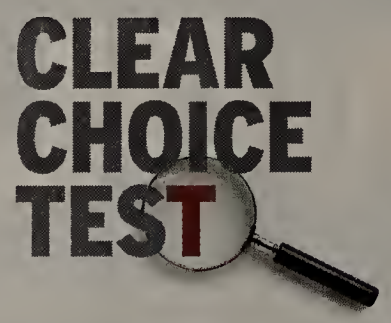
Cloud vendors ace groundbreaking test

Terremark, Rackspace, BlueLock deliver fast, secure cloud services

BY TOM HENDERSON AND BRENDAN ALLEN, EXTREMELABS



The potential benefits of public clouds are obvious to most IT execs, but so are the pitfalls — outages, security concerns, compliance issues, and questions about performance, management, service-level agreements and billing. At this point, it's fair to say that most IT execs are wary of entrusting sensitive data or important applications to the public cloud.

But a technology as hyped as cloud computing can't be ignored either. IT execs are exploring the public cloud in pilot programs, they're moving to deploy cloud principles in their own data centers, or they are eyeing an option that goes by a variety of names — enterprise cloud, virtual private cloud or managed private cloud.

We're using the term enterprise cloud to mean an extension of data center resources into the cloud with the same security, audit and management/administrative components that are best practices within the enterprise.

In this first-of-its-kind test, we invited cloud vendors to provide us with 20 CPUs that would be used for five instances of Windows 2008 Server and five instances of Red Hat Enterprise Linux — two CPUs per instance. We also asked for a 40GB internal or storage-area network/iSCSI disk connection, and 1Mbps of bandwidth from our test site to the cloud provider. And we required a secure VPN connection.

Rackspace, Terremark and BlueLock accepted our invitation. Amazon did, then did not and refused to communicate further. The services we tested were comparable in many respects. Rackspace Managed Private Cloud scored points for cost transparency, a solid administrative portal and good overall performance. Rackspace was the slowest in many portions of the tasks we needed them to complete, although, to be fair, we were making requests that were outside of their traditional sales channels. Terremark Enterprise Cloud delivered speed and the best administrative portal, and also offered the lowest cost. The BlueLock Virtual Cloud offered strong processes and good administrative support, but was the most expensive.

Over the course of conducting this test, we learned several things. First, a customer can expect to have an enterprise cloud deployed and up and running within a week after the selection process is complete. Second, all the vendors delivered strong security and comparable performance, albeit with vastly contrasting management components.

And, we found that enterprise cloud services can be expensive. We also discovered that each vendor seemed "squishy" on overall pricing. Our recommendation is to not assume that the enterprise cloud route is automatically less expensive than buying and provisioning your own servers. Do a thorough cost analysis and make sure to pin down your vendor when it comes to specific items like bandwidth.

Seeding the clouds

We contacted each vendor, described our requirements and waited for the proposals.

Each vendor has a different process to arrive at a quote for the resources we asked for, which amounted to a small subset to the wide array of possible offerings in each vendor's menu. While each vendor had a different list of options, there were many commonalities. Ordering virtual private cloud or enterprise cloud services meant getting dedicated machines with gear we wanted and a connectivity method that would link our network operations center at n|Frame in Indianapolis to the vendor's resources through VPN connectivity, which should be used as a demarcation point for both security and cost purposes.

BlueLock's hardware choices were among the narrowest, but they won points for having a thorough and deliberate quotation and subsequent provisioning process. They use forms made of Excel worksheets to exchange information, but the interactivity of information exchanged was thorough and well thought out. By contrast, Rackspace offered the most flexibility in many ways.

Terremark's rapid speed of delivery (three days) earned the product high marks as it delivered quickly and to spec — all things we like in a cloud vendor. But the other vendors weren't far behind — BlueLock delivered in five days and Rackspace in six.

BlueLock

BlueLock has an openly published security process, which initially intrigued us, and we were reminded of an almost military provisioning process. We e-mailed the company with our desired configuration, and BlueLock responded with a detailed proposal. BlueLock creates the offering from a source document build list. Once we said "go", BlueLock created the entire private cloud, operating systems deployment, initial security, IP routing and so on. We didn't create the virtual machines (VM) and BlueLock provisioned the VMware instances (VMware 3.5 at this writing; 4.0 soon). We received dedicated hardware running on HP blades, which are their only hardware platform.

For connectivity via VPN and firewalling, BlueLock provided a CheckPoint SSL VPN whose administrative interface doesn't work with very many browser platforms; we tried various setups but only were able to get it to work in Windows XP and Internet Explorer (and Firefox 3.5 with Java installed). Windows 7 with IE8 or Firefox, Mac OS X 10.5/10.6.x with Safari, Firefox, did not work at all. Once inside CheckPoint, it works well and it's an enterprise-class workhorse firewall and VPN. BlueLock was also able to pass our not-

NETRESULTS

Product	Terremark	Rackspace	BlueLock
Web site	Terremark.com	Rackspace.com	BlueLock.com
Pros	Fast to deploy; best administration portal; lowest cost.	Flexible hardware, good administration portal.	Thorough transactional, provisioning process; flexible configurations.
Cons	Most services are optional.	Took the longest to set up.	Limited hardware selection.
Score	4.1	3.9	3.8

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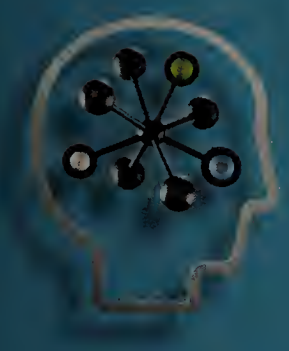

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a-Cisco VPN test, by connecting to our Vyatta router/VPN appliance quickly.

The management interface to our 10 operating systems instances could have been better. There is no Web interface for accessing VMs (you can only connect to instances directly after connected through the SSL VPN or through IPSec site-to-site VPN; we tried both). Cloud administration was stiff. BlueLocks's own Vital Signs portal is a Web-based shell program that in turn calls other administrative applications. Vital Signs displays choices including a Vital Signs Diagram (which wasn't useful, as it shows a user count, and our agreement did not concern users, so it displayed "one user"), and Event Monitoring Portal (the FOSS tool, Nagios), a Trend Portal (the FOSS tool Cacti), a non-working Reports screen, a Ticket and Support System (trouble ticket submission and process control), a portal user account maintenance facility, and FAQs.

Nagios is an open source network monitoring tool that we used to monitor network services such as http or mysql servers, along with whether the host is alive (ping test). We could also set alarms or notifications if a Nagio-tested service failed. The Cacti trend portal showed us VM and firewall information. Cacti does a great job of showing time series sample graphs of CPU usage, network activity, memory usage and disk usage. We found BlueLock's Vital Signs Ticket and Support System to be frustrating, as it gave us only summarized information and no transaction or billing history. The Vital Signs portal isn't well connected, in terms of applications integration, as pieces can't be related together as objects in easy ways. While most of the discrete applications are useful, they're very disjointed.

We logged on to check BlueLock's administrative interface, then dove into forming our test suite, which consisted of installing LAMP/WAMP onto each operating system instance that had been created. We checked BlueLock's performance with an Apache benchmark. It turned out that all of the vendors performed within a narrow window.

We tested storage expansion, which was simply a matter of submitting a new support ticket. And BlueLock configured the IPSec tunnel correctly — except for our public IP, none of the resources could be seen, and the CheckPoint firewall and tunnel manager kept it that way.

BlueLock had a very fast connection to our network operations center (NOC) — uploads at 7.26Mbps and downloads at 8.8Mbps. But it's also located only a few miles away from our n|Frame NOC resources (our subscribed bandwidth was 1Mbps burstable to 10Mbps).

SCORECARD

Product	Terremark	Rackspace	BlueLock
Management/ Administration	4.25	4	3
Processes	4	3.75	4.25
Provisioning	4	4	4.25
Costs/Value	4	4	3.75
Total	**4.1**	**3.9**	**3.8**

SCORING KEY: 5: EXCEPTIONAL; 4: VERY GOOD; 3: AVERAGE; 2: BELOW AVERAGE; 1: SUBPAR OR NOT AVAILABLE

Overall, BlueLock's negotiation process is good, and its security components were well managed. The BlueLock administrative method had applications that feel like separate products. Nothing is really connected together, most portals launch in another browser window, some even require a separate login/password combo. Administration is unnecessarily confusing using these tools. And since BlueLock controls changes to the operating systems deployed, the time between ticket submission and a change could be considerable. We wanted to occasionally use our root account just to get things done.

Terremark

Terremark's negotiation process is less formal than BlueLock's, although all of our private cloud metrics were met fully by Terremark. Terremark's hardware offerings are just slightly more expansive than those from BlueLock, as Terremark uses HP 580 and 585 servers. Terremark also offered us a variety of bundles that were predefined hardware/software asset combinations.

The build-time was shorter — they were the first online and were ready-to-go quickly, although part of the speed came from the fact that Terremark didn't provision our instances of Red Hat, and only offered Windows 2008 (not R2) server instances, with no maintenance, although it can be procured.

We told them the specs, they replied with a few questions, and in a couple of days, the components were built and we connected our NOC and the Terremark NOC. Terremark used VMs, like BlueLock, as the substrate for our requested network, and the connections to our Vyatta router/VPN appliance integrated quickly with their Cisco components.

Administrative interface

In the interest of time, Terremark had us provision our own VMs, which was a simple task. We were allocated the desired number of CPUs, RAM, disk and network for us to divide into the "shape" of the cloud we wanted. The Terremark-developed DigitalOps administrative app interface was used to deploy our Windows and Linux instances from one-click templates. Terremark supplied the Windows licenses (ostensibly from a volume license) and supplied Red Hat operating systems — but we registered licenses supplied to us by Red Hat. Rollout, therefore, was drama-free and just 10 clicks for 10 instances. Terremark can optionally install everything for you at additional cost. We had the option of rolling out other types of server licenses operating systems from ISO images as well.

DigitalOps has a user interface that's separated into two main tabs, Environment and My Account. Under Environment there are three tabs: Resources, Devices and Network. The Resources tab displays information about processor, memory and storage usage. The main Resources page has a summary of each for the past 24 hours and is very easy to understand. We could get more detailed information by using the sub-tabs about each individual component (processor, memory, storage) if desired. The Devices tab lists all the VMs that we created, which can be sorted into groups and rows. We could create VMs from prebuilt templates or create a blank server using our own ISO, as mentioned.

We could use a VPN Connect button that allowed us to link to an SSL VPN (which is required to actually connect to the consoles of the VMs created). The final tab in the Environment section is network. Here we could view the IP networks assigned to us, internal, external and public IP addresses. We could also set up firewall and port-forwarding rules, although they are very basic and we couldn't customize it very much.

Enterprise cloud pricing: Your mileage may vary

Doing a cost comparison between various cloud service vendors is tricky, since each vendor offers a parade of options and pricing schemes. However, we tried to do an apples-to-apples comparison of the three services we tested. We also tried to estimate what it would cost to deploy the same resources inside the data center. Of course, the do-it-yourself option doesn't take into account some of the reasons that companies move to cloud computing, such as speed and flexibility. Plus the DIY numbers don't include staffing facilities costs.

	BlueLock	Terremark	Rackspace	DIY
Initial setup/ Installation costs	$21,437.86	$0.00	$0.00	$34,080 Three Dell PowerEdge R710 servers, plus VMware vSphere 4.0.
Resources (20 cores, 40GB RAM)	$5,196	$7,000	$5,531.40 (3 R710s, DualProc, 36GB Ram, z2x146GB HD)	$4,860, monthly costs for 9U in NOC x12
Storage (monthly)	$700 200GB SAN+backup	$370 500GB	$1,512 750 GB FC SAN	$0.00
Bandwidth (monthly)	$250 1Mbps (burst to 10) (possible bandwidth overage charges)	$125 5Mbps	$0.00 2TB per server of data transferred (included above)	$3,000, monthly bandwidth costs x12
VPN setup fee (site-to-site)	$600	$0.00	$0.00	$0.00
VPN connectivity (monthly)	$0.00 Uses above bandwidth	$200.00 1Mbps	$100	$0.00
RedHat 5 licenses 64bit	$1,625 Includes 40GB OS drive	$0.00 Must provide own license	$1,117.20	$1,995.00 5 Red Hat Enterprise Linux 5.3 licenses with one year support
Microsoft Windows Server 2008 5 licenses (64bit)	$1,645 Includes 40GB OS drive	$165 Without Active Directory	$1,209.60	$8,970 Windows Server 5 licenses with 1 year support and 150 client licenses
Firewall/router (monthly)	$792.50 CheckPoint firewall	$0.00 Included in resources	$343.56	$3,297.00 Vyatta 2501 router, Dell PowerConnect 2824 switch (24x1GbE)ports
Support	$510.43 24x7	$0.00 24x7 but no OS/ app support	$0.00 24x7	$0.00
Total cost for 1st month	$32,756.79	$7,860.00	$9,813.76	
Estimated cost for next 11 months	$117,908.23	$86,460.00	$107,951.36	
Estimated cost for 1st year	$150,665.02	$94,320.00	$117,765.12	$56,202.00

NOTE: TOTAL COST FOR FIRST MONTH INCLUDES INITIAL SETUP AND VPN SETUP FEES, PLUS ONE MONTH'S USAGE. THE ESTIMATED COST FOR NEXT 11 MONTHS IS BASED ON FIRST MONTH'S USAGE FEE MULTIPLIED BY 11.

Site-to-site VPNs were a separate package deal, but possible to do using the IPSec protocol. Terremark only supports certain hardware or software VPNs, but they will do a "best effort" to try to get things working, if you have something different. We had something different, the aforementioned Vyatta appliance and we got the VPN working with minimal trouble. Once everything was set up, we ran some brief upload tests between our NOC and their servers. During an ISO transfer using scp, we maxed out around 120KBps (average). Normal FTP was about the same around 125KBps. The connection was limited to 1Mbit (not burstable), which is about 128KB, so it was pretty much maxing out the connection.

Terremark supplied an older VMware

console plugin (which oddly doesn't work in Windows 7 under IE 8 or Firefox 3.6 but did work in Firefox 3.5.7) but none of the other competitors offered any option to connect to the VMs via their respective Web interfaces — and Terremark did. This wasn't as much of an issue with the Windows VMs (meaning console VM access) as the Windows Server virtual machines had Remote Desktop turned on to give us access. We had a few small quibbles with the templates used to generate the RHEL virtual machines, as the template did not create a user besides root (therefore, we couldn't SSH in, as root SSH is disabled by default).

The Terremark committed bandwidth pricing is complicated and is based on a "95th percentile" scheme, where they take the top 5% of your traffic for the month, drop that from calculations and use the final 95% of the bandwidth you used to figure out a price. You must purchase a Committed Bandwidth package. Ours was the 5Mbit package, which is $25 per Mbit, so $125 in total.

If you stay within the committed 5Mbit, you will only pay $125 a month. The extra charge comes in when you use more than your allocated bandwidth. Say you go over by 1Mbit for a total of 6Mbit, then you will have to pay 2x the Mbit fee (so $25 per Mbit would be $50 per Mbit for overage). Our total for the month would then be $175. Fortunately, Terremark allowed us to cap the bandwidth at 5Mbps for the VPN connection, which is all we used. According to the billing invoice our Committed Bandwidth was in the 5M to 50Mbps Tier but that does not apply to the VPN. The VPN bandwidth is a flat-rate per month based on connection speed and is not included in regular bandwidth calculations. They have the following tiers: 1Mbit = $200; 3Mbit = $550; 6Mbit = $1085; 10Mbit = $1285.

Overall, we liked Terremark's management app, and its speed to delivery. Provisioning was simple — even though we did all of the VMs from the pool allocation allotted to us, and integration with our non-standard router was painless. We don't mind pain for gain, but it wasn't necessary with Terremark.

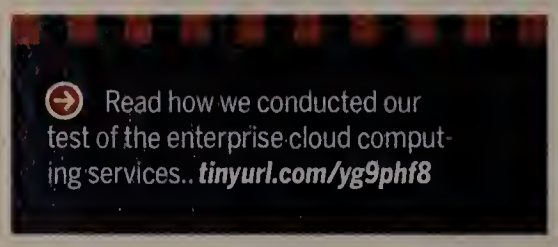
Rackspace

We were a little frustrated by Rackspace. Rackspace's process was slow, and may be faster for others as our negotiation and installation were done somewhat outside of their normal sales processes. The upside is that Rackspace's costs were more transparent and once rolling, its performance was very good. Rackspace provisioned us on Dell hardware, but emphasizes that most other top tier brands/models are available. We got the feeling that they're used to dealing on longer negotiation cycles with more diverse hardware needs, and deployment cycles associated with very large organizations.

Once the hardware and VMs had been provisioned, our site-to-site VPN took a while to integrate as well — and much longer than the competition in our not-using-Cisco test. Once the VPN worked, it was smooth sailing, although IIS was installed on every Windows Server 2008 machine (we used Apache for testing), so we had to uninstall everything (IIS stuff) first. Some of these seeming disconnects could have been the result of our abnormal provisioning. The Red Hat Enterprise Linux VMs were correctly set up. As with BlueLock, Rackspace's virtual private cloud was fully provisioned on top of VMware ESX 3.5 by Rackspace so we didn't have to create the machines ourselves. There is a spot in the administrative Web interface to create new VMs (through a request), but this is limited to Windows Server 2003 and RedHat RHEL 3, 4 and 5. It's possible to have what you like (such as VMs), but you must submit a ticket for that with incumbent additional cost.

We liked the Rackspace administrative portal, which had six main divisions: Support, Products, Services, Network, Account (management) and Community. It's integrated, like Terremark's, and offers a tabular method of drilling down to support tickets, viewing each server resource utilization, viewing time series of performance characteristics, and administering our account. We found the Community tab interesting, as it took us to a private user forum. The forum is designed not be used for trouble tickets, but rather for communication among Rackspace clients for items such as application integration, performance tweaks and so on. This type of community-based communications was missing in BlueLock's and Terremark's offerings. It's like an internal user group.

Rackspace's communications with our n|Frame NOC was very fast, despite the long distance (Indianapolis to Austin) and we were happily surprised at the speed. Our ability to control VMs was also good, and we could manipulate our VMs readily although we couldn't actually connect to the console of the VM from an external (to the VPN) connection. It's also possible to review antivirus and URL monitors, but we didn't 'purchase' these.



Interestingly, we could use the portal to buy SSL certificates (five types from VeriSign or two types from Thwate) — very convenient.

We provisioned the RackspaceVMs for testing with our benchmark and connectivity tests. There were no mysteries, and Rackspace's Dell hardware performed well. We had no difficulties administering changes with Rackspace although gaps in their response were as mentioned, likely to have been the product of not being an actual customer.

We liked Rackspace and were it not for its slowness, we'd have liked the product much better, even though we know we were exceptions to their normal sales/fulfillment process. Rackspace's portal is useful, although with fewer choices than Terremark's and with a bit less functionality. As we seemed to have hurried them, we didn't get the full customer experience we were hoping for. Nonetheless, they were in the mid-range of pricing, and performed very well.

Costs

We asked each competitor to keep track of costs for us. Each competitor was a bit cagey and all wanted to emphasize that costs are variable and tiered. They did, however, eventually get us pricing that reflected our utilization figures after we tested each private cloud with a performance analyzer to gauge CPU, bandwidth, VPN, storage and other costs.

We also attempted to compare the three service providers with a do-it-yourself option — in other words, buying hardware and software and deploying the apps on your own. With the comparison lies strong caveats. If one uses a DIY-type solution, there are hidden expenses involved that we didn't include in our estimate. These include support staffing, and leasehold costs, although we did include a collocation cost for power and space, at $45 per rack one unit per month pro-rated over the cost of the Dell hardware we chose in our DIY cost simulation. We also didn't include applications or application support, although these aren't covered by our competitors, either. Nor is the cost of negotiations, procurement, shipping or building the hardware components included.

Our final caveat is that pricing appears to be a moving target, and a heavily guarded sales secret. And for those using virtual private clouds for availability, N+1 or 2N availability requires off-premises extensions of equipment, making DIY impractical. ■

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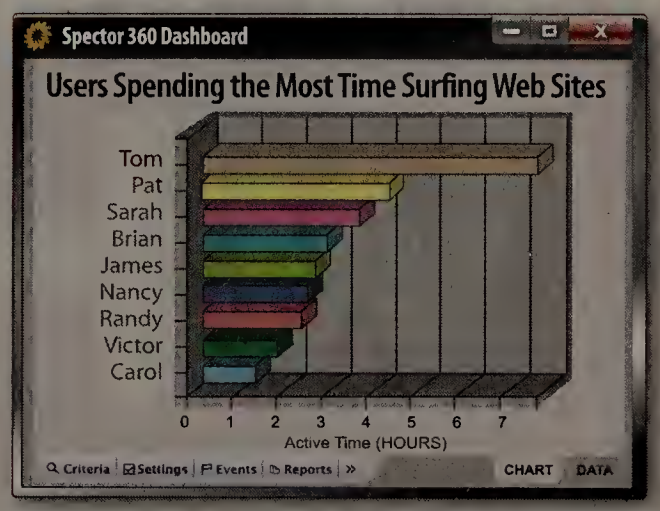

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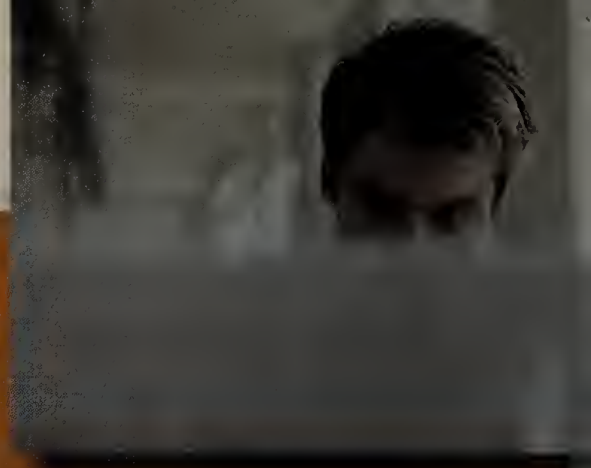

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Periodical postage paid at Framingham, Mass., and additional mailing offices. Posted under Canadian International Publication agreement #PM40063731. Network World (ISSN 0887-7661) is published twice monthly by Network World, Inc., 492 Old Connecticut Path, Framingham, MA 01701-9002. **Network World** is distributed free of charge in the U.S. to qualified management or professionals. To apply for a free subscription, go to www.subscribenw.com or write Network World at the address below. No subscriptions accepted without complete identification of subscriber's name, job function, company or organization. Based on the information supplied, the publisher reserves the right to reject non-qualified requests. Subscriptions: 1-877-701-2228. Non-qualified subscribers: $5.00 a copy; U.S.—$129 a year; Canada—$160.50 (including 7% GST, GST#126659952); Central & South America—$150 a year (surface mail); all other countries—$300 a year (airmail service). Digital annual subscription rate of $29.99. Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin. Please include mailing label from front cover of the publication. Network World can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zebb Road, Ann Arbor, Mich. 48106. **PHOTOCOPYRIGHTS:** Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by Network World, Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $3.00 per copy of the article, plus 50 cents per page is paid to Copyright Clearance Center, 27 Congress Street, Salem, Mass. 01970. **POSTMASTER:** Send Change of Address to Network World, P.O. Box 3090, Northbrook, IL 60065. Canadian Postmaster: Please return undeliverable copy to PO Box 1632, Windsor, Ontario N9A7C9.

USPS735-730

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BACKSPIN | BY MARK GIBBS

Many ethical answers

IN A Backspin column a couple of weeks ago I posed questions about ethical behavior in an IT setting and, much to my pleasure, a lot of people commented on the article.

Some of the online feedback raises an interesting issue concerning people who respond anonymously and occasionally somewhat rudely. I consider it to be unethical not to publicly stand by the opinions you express in public, particularly when you are snarky.

Such a response came from two Anons who whined about the thumbnail definition I gave for ethics and, in so doing, ignored the fact that I was discussing the narrower topic of business ethics. That said, the rest of you were extraordinarily thoughtful in your responses.

I don't have room to slice and dice all of the feedback but a couple of interesting trends appeared that are worth noting.

The first is that most of you aren't tolerant of any kind of cheating and, it appears, would be willing to speak out despite a risk to your own careers. The second trend is that you are loyal to your organizations.

What I find interesting is that you all seem to recognize that you are, in the eyes of your organizations, dispensable, but despite that you would go out of your way to "do the right thing" for the company. It appears that you are, in general, ideal employees.

This raises a question: Why, when you recognize that your organization is only as committed to you as it has to be, are you more committed in return? I think the great example of this is how many organizations ask you to give 110% yet when the going gets tough, don't reciprocate.

Finally, the bonus question asked which of three applicants you would hire given a background check revealed two as womanizing, heavy drinking, party boys while the third hardly drinks, is a war hero and a vegetarian.

Online, reader "GooRu" said he'd never trust a vegetarian, while reader "YesIAmAnon" declared he would choose the third candidate: "Probably a lower risk to the organization, and some evidence [that he is] a more ethical person".

Reader Lon Feuerhelm contended that "Nothing in the final candidate would eliminate him, so if he were qualified as a manager, he might get the nod. However, personally I would not hire any of them and re-advertise the position." And reader Ken Diliberto asked, "Are you kidding? A vegetarian? Really? OMG! How could you suggest such a candidate?? Is living in the Peoples Republik of Kalifornia starting to get to you? Are you in need of supplemental oxygen?" Diliberto added "As long as they didn't rule with an iron fist, there's a possibility you could teach the third candidate to like a good steak."

Longtime reader and frequent responder, Tom Franciosi, claimed he "would party with the first two and hire the last one. Reasons: 1) I work well with anyone who has served in the armed forces, 2) healthy life style means they would likely outlive the others and contribute more to the company, and 3) healthier life style would help contain my company's rising healthcare expenses."

You may not be surprised to learn that the bonus question was a trick. The three profiles were, in order, Winston Churchill, Franklin Roosevelt and Adolf Hitler. ■

Gibbs is not a model employee in Ventura, Calif. Your resumes to backspin@gibbs.com.

NETBUZZ | BY PAUL MCNAMARA

No one can duck Heartland fallout until it ends

LAST WEEK'S report of JC Penney trying to keep its name out of the Heartland credit card debacle didn't get anywhere near the attention heaped upon hacker mastermind Albert Gonzalez netting himself a 20-year prison sentence in the case, so it's definitely worth a mention here.

According to an IDG News Service report, JC Penney attorneys argued in December of last year that, absent evidence of resultant identity theft, disclosing the retail chain's role as a victim in the Heartland case "may discourage other victims of cybercrimes to report the criminal activity or cooperate with enforcement officials for fear of the retribution and reputational damage that may arise from a policy of disclosure as espoused by the government in this case."

U.S. prosecutors stated the obvious in response: "Most people want to know when their credit or debit card numbers have been put at risk, not simply if, and after, they have clearly been stolen."

The scales of justice eventually tipped in favor of disclosure, but only after a Massachusetts judge undid the bamboozlement that had allowed a New Jersey judicial counterpart to buy into JC Penney's sorry song and dance.

And should anyone doubt the wisdom of that corrective decision, they should have a chat with one of 5,000 customers of Colorado's First National Bank of Durango, who had no idea that they were potential Heartland victims until being notified only March 1 of this year. Actually, as many as 20 of them may have suspected earlier when they started noticing fraudulent charges to their accounts.

I learned of the Colorado bank victims through an item in a newsletter published by DataLossDB and asked one of that organization's project managers, Kelly Todd, whether it was indicative of there being yet more Heartland time bombs ticking out there; little stashes of card numbers just waiting to be used by your more patient criminals.

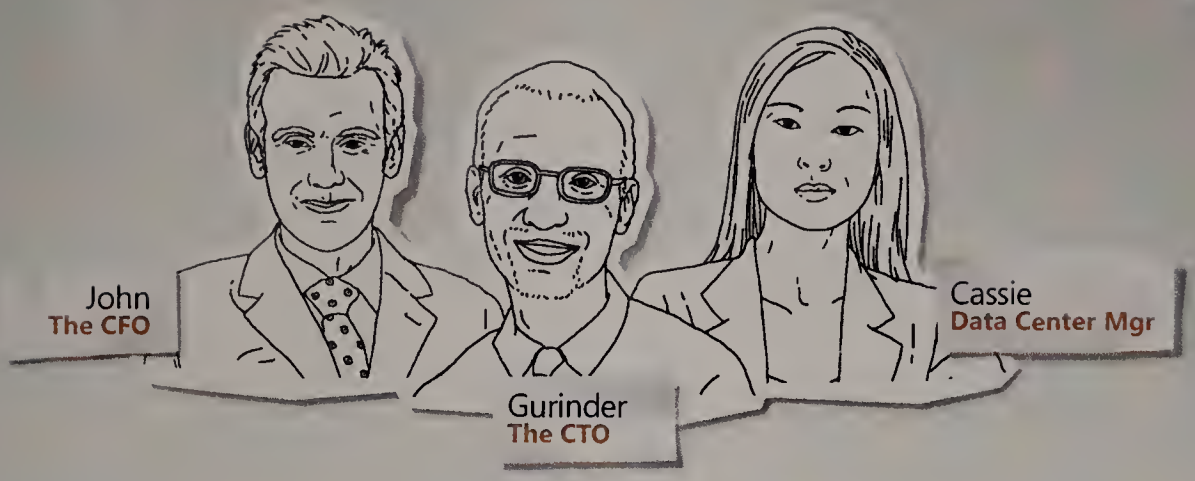
Todd's reply: "Yes, that's how I read it, too. At least one list subscriber mailed me off-list to ask why people don't realize that once card numbers or other personal information has been compromised, said information is compromised forever (or at least until the information changes, which won't happen for SSN, DOB, and 99.999% of the time, a name). A year later and still reporting Heartland-related news? Sure. Card numbers will be out there at least until they get cancelled or expire, and my new cards usually have the same number as the old one, so if they're in the hands of the bad guys, I'm probably at risk without even knowing it."

The bottom line here is that corporate executives will first and foremost always be focused on their corporate interests: their own bottom lines. Of course they'd rather not have their good names sullied by association with an identity-theft case of this magnitude. And of course they'll trot out the lawyers to downplay the exposure to their customers . . . it's all part of minimizing their own exposure.

As the U.S. prosecutor noted in opposing JC Penney's responsibility dodge, most people want to know when their credit or debit card numbers have been put at risk. You can be certain that "most people" here includes the JC Penney lawyers who argued otherwise. ■

Speaking of personally identifiable information that never changes, the address is buzz@nww.com.

Microsoft



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